

CLAIMS

We claim:

1. An apparatus for percutaneous application, comprising:
 - a housing;
 - a percutaneous probe having a sharp end and being positioned within the housing, the percutaneous probe movable relative to the housing between a stowed position and at least one of a first deployed position and a second deployed position, with the percutaneous probe projecting from the housing by a first distance when in the first deployed position, and with the percutaneous probe projecting from the housing by a second distance greater than the first distance when in the second deployed position; and
 - a depth control device operatively coupled to the percutaneous probe, the depth control device having a first configuration to allow the percutaneous probe to be moved to the first deployed position, the depth control device having a second configuration to allow the percutaneous probe to be moved to the second deployed position.
2. The apparatus of claim 1, wherein the depth control device includes a pre-adjustable portion configured to be movable between a first stop position and a second stop position without moving the percutaneous probe, and wherein the percutaneous probe is movable to the first deployed position when the pre-adjustable portion is in the first stop position, the percutaneous probe movable to the second deployed position when the pre-adjustable portion is in the second stop position.
3. The apparatus of claim 1, wherein the depth control device includes a tab releasably coupled to the housing, the tab positioned to at least impede movement of the percutaneous probe when the tab is coupled to the housing.
4. The apparatus of claim 1, further comprising an actuator carrying the percutaneous probe, the actuator being rotatably supported by the housing, the actuator rotatable between a first position with the percutaneous probe in the first deployed position and a second

position rotationally spaced apart from the first position with the percutaneous probe in the second deployed position.

5. The apparatus of claim 1, further comprising a locking device positioned to selectively restrict motion of the percutaneous probe when the percutaneous probe is in at least one of the stowed position, the first deployed position and the second deployed position.

6. An apparatus for percutaneous application, comprising:

a housing; and

a percutaneous probe having a sharp end and positioned within the housing, the percutaneous probe movable relative to the housing between a stowed position and a deployed position, wherein at least part of the percutaneous probe has a generally non-linear shape when the percutaneous probe is in the stowed position, and wherein the at least part of the percutaneous probe has a generally linear shape when the percutaneous probe is in the deployed position.

7. The apparatus of claim 6, wherein the percutaneous probe is movable to at least one of at least two deployed positions, and wherein the apparatus further comprises a depth control device operatively coupled to the percutaneous probe, the depth control device having a first configuration to allow the percutaneous probe to be moved to a first deployed position, the depth control device having a second configuration to allow the percutaneous probe to be moved to a second deployed position.

8. An apparatus for percutaneous application, comprising:

a housing;

a first percutaneous probe positioned within the housing, the first percutaneous probe having a sharp end and a first percutaneous length, the first percutaneous probe movable relative to the housing between a first stowed position and a first deployed position; and

a second percutaneous probe positioned within the housing simultaneously with the first percutaneous probe, the second percutaneous probe having a sharpened end and a second percutaneous length, the second percutaneous probe movable relative to the housing between a second stowed position and a second deployed position.

9. The apparatus of claim 8, wherein the housing has an exit portion and an at least partially light transmissive portion positioned proximate to the exit portion, the at least partially light transmissive portion being positioned to allow visual access to the exit portion as the first percutaneous probe is moved to the first deployed position.

10. An apparatus for percutaneous application, comprising:

a housing;

a percutaneous probe having a sharp end and disposed within the housing, the percutaneous probe being movable relative to the housing between a stowed position and at least one of a first deployed position and a second deployed position, the percutaneous probe having a first deployed length external to the housing when in the first deployed position, the percutaneous probe having a second deployed length external to the housing when in the second deployed position; and

a tool movable relative to the housing, the tool having an engaging portion positioned to selectively engage the percutaneous probe at a first axial location to move the percutaneous probe to the first deployed position, the engaging portion positioned to selectively engage the percutaneous probe at a second axial location spaced apart from the first axial location to move the percutaneous probe to the second deployed position.

11. The apparatus of claim 10, wherein the engaging portion includes first and second clamp arms pivotable relative to each other to engage and disengage the percutaneous probe.

12. An apparatus for percutaneous application, comprising:
 - a housing having an exit portion and an at least partially light transmissive portion positioned proximate to the exit portion; and
 - a percutaneous probe having a sharp end and disposed within the housing, the percutaneous probe movable relative to the housing between a stowed position and a deployed position, with at least part of the percutaneous probe extending out of the housing at the exit portion when the percutaneous probe is in the deployed position, and with the at least partially light transmissive portion positioned to allow visual access to the exit portion as the percutaneous probe moves to the deployed position.
13. The apparatus of claim 12, wherein the at least partially light transmissive portion includes a window opening.
14. The apparatus of claim 12, wherein the percutaneous probe is movable to at least one of two deployed positions, and wherein the apparatus further comprises a depth control device operatively coupled to the percutaneous probe, the depth control device having a first configuration to allow the percutaneous probe to be moved to the first deployed position, the depth control device having a second configuration to allow the percutaneous probe to be moved to the second deployed position.
15. The apparatus of claim 12, wherein at least part of the percutaneous probe has a generally non-linear shape when the percutaneous probe is in the stowed position, and wherein the at least part of the percutaneous probe has a generally linear shape when the percutaneous probe is in the deployed position.
16. An apparatus for percutaneous application, comprising:
 - a housing;
 - a percutaneous probe having a sharp end and disposed within the housing, the percutaneous probe movable relative to the housing between a stowed position and at least one deployed position;

a plunger coupled to the probe, the plunger having a handle portion positioned to receive an operator's hand; and

an electrical coupling in releasable contact with the percutaneous probe, wherein the electrical coupling is removable from the housing independently of the plunger.

17. The apparatus of claim 16, wherein the plunger and the electrical coupling are each movable relative to the housing with the percutaneous probe as the percutaneous probe moves from the stowed position to the at least one deployed position.

18. The apparatus of claim 16, wherein the plunger is movably engaged with the housing to move along a generally helical path as the percutaneous probe moves from the stowed position to the at least one deployed position.

19. An apparatus for percutaneous application, comprising:

a housing having a first aperture positioned to releasably receive an electrical coupling and a second aperture positioned to receive a plunger;

a percutaneous probe having a sharp end and disposed within the housing, the percutaneous probe movable relative to the housing between a stowed position and at least one deployed position, the percutaneous probe positioned to releasably contact the electrical coupling; and

a plunger fixedly coupled to the probe and positioned in the second aperture, the plunger having a handle portion positioned to receive an operator's hand.

20. The apparatus of claim 19, wherein the percutaneous probe is movable to at least one of two deployed positions, and wherein the apparatus further comprises a depth control device operatively coupled to the percutaneous probe, the depth control device having a first configuration to allow the percutaneous probe to be moved to the first deployed position, the depth control device having a second configuration to allow the percutaneous probe to be moved to the second deployed position.

21. An apparatus for percutaneous application, comprising:

a housing having an attachment device configured to be releasably attached to a recipient's skin, the housing further having an external housing surface extending away from the attachment device and facing outwardly transverse to the attachment device;

a percutaneous probe having a sharp end and disposed within the housing, the percutaneous probe movable relative to the housing between a stowed position and at least one deployed position;

an actuator movably disposed within the housing, the actuator carrying the percutaneous probe and having a receiving portion; and

an actuator tool having an engaging portion positioned to releasably engage the receiving portion of the actuator, the actuator being movable between a first position and a second position, with the percutaneous probe in its stowed position when the actuator tool is in its first position and with the percutaneous probe in its deployed position when the actuator tool is in its second position, and wherein at least a portion of the housing surface is exposed when the actuator tool is in the first position and covered by the actuator tool when the actuator tool is in the second position.

22. The apparatus of claim 21, wherein the housing includes an exit portion through which the percutaneous probe extends when in the deployed position, and wherein the surface of the housing faces transverse to the exit portion, further, wherein the actuator tool includes a grip portion configured to receive an operator's hand, and wherein the grip portion is positioned adjacent to the surface of the housing when the actuator tool is in the second position.

23. A method for operating a percutaneous probe apparatus, comprising:

choosing a selected deployment depth from at least a first deployment depth and a second deployment depth;

deploying the percutaneous probe to the selected deployment depth in a recipient's tissue;

halting deployment of the percutaneous probe at the selected deployment depth with a depth control device of the percutaneous probe apparatus having one of at least two configurations;

 withdrawing the percutaneous probe from the recipient's tissue; and
 stowing the percutaneous probe in the housing.

24. The method of claim 23, wherein the depth control device includes a pre-adjustable portion configured to be movable between a first stop position and a second stop position without moving the percutaneous probe, and wherein the method further comprises:

 moving the pre-adjustable portion to the first stop position without moving the percutaneous probe; and

 moving the percutaneous probe to the selected deployment depth when the pre-adjustable portion is in the first position.

25. The method of claim 23, wherein the percutaneous probe is carried by an actuator and wherein the actuator is movable relative to the housing, further wherein one of the actuator and the housing includes first and second detents and the other of the actuator and the housing includes an engaging portion positioned to be selectively engaged with at least one of the first and second detents, and wherein halting motion of the percutaneous probe includes engaging the engaging portion with the first detent.

26. The method of claim 23, wherein deploying the percutaneous probe includes rotating an actuator carrying the percutaneous probe to a first of two rotationally spaced apart positions.

27. The method of claim 23, further comprising locking the percutaneous probe at the selected deployment depth.

28. A method for operating a percutaneous probe, comprising:
stowing the percutaneous probe in a housing with at least part of the percutaneous probe having a generally non-linear shape; and
deploying the percutaneous probe into a recipient's tissue with the at least part of the percutaneous probe having a generally linear shape.
29. The method of claim 28, further comprising:
choosing a selected deployment depth from at least a first deployment depth and a second deployment depth; and
deploying the percutaneous probe to the selected deployment depth in the recipient's tissue by releasably coupling an actuator to the percutaneous probe at one of at least two positions along a length of the percutaneous probe.
30. A method for deploying a percutaneous probe, comprising:
supporting a percutaneous probe housing having a first percutaneous probe with a sharp end and a first percutaneous length, the first percutaneous probe movable relative to the housing between a first stowed position and a first deployed position, the housing further having a second percutaneous probe with a sharp end and a second percutaneous length, the second percutaneous probe movable relative to the housing between a second stowed position and a second deployed position;
selecting at least one of the first and second percutaneous probes; and
deploying the at least one percutaneous probe into a recipient's tissue.
31. The method of claim 30, wherein the first and second percutaneous probes are carried by a rotatable magazine, and wherein the method further includes rotating the magazine to select one of the percutaneous probes.
32. A method for operating a percutaneous probe, comprising:
supporting a housing having a percutaneous probe that is movable relative to the housing between a stowed position, a first deployed position and a second deployed

position, the percutaneous probe having a first deployed length external to the housing when in the first deployed position, the percutaneous probe having a second deployed length external to the housing when in the second deployed position;

selecting either one of the first and second deployed positions;

deploying the percutaneous probe from the housing to the one of the first and second deployed positions; and

halting movement of the percutaneous probe beyond the at least one of the first and second positions.

33. The method of claim 32, further comprising releasably engaging a tool with the percutaneous probe at one of two axial locations of the percutaneous probe, with a first axial location corresponding to the first deployed position and a second axial location spaced apart from the first axial location and corresponding to the second deployed position.

34. The method of claim 32, further comprising releasably clamping a portion of a tool around the percutaneous probe at one of two axial locations of the percutaneous probe, with a first axial location corresponding to the first deployed position and a second axial location spaced apart from the first axial location and corresponding to the second deployed position.

35. A method for operating a percutaneous probe, comprising:

releasably attaching to a recipient's skin a housing having a percutaneous probe and an exit portion through which the percutaneous probe exits the housing; and

deploying a sharp end of the percutaneous probe from the housing into the recipient's skin while visually accessing the exit portion through an at least partially light transmissive portion of the housing.

36. A method for operating a percutaneous probe, comprising:
- supporting a housing having a percutaneous probe, the percutaneous probe movable relative to the housing between a stowed position and at least one deployed position, the percutaneous probe coupled to a plunger;
- releasably connecting an electrical coupling to the percutaneous probe, wherein the electrical coupling is removable from the housing independently of the plunger; and
- deploying the percutaneous probe by moving the plunger relative to the housing.
37. The method of claim 36, wherein moving the plunger includes moving the plunger along a generally helical path, and wherein the method further comprises carrying the electrical coupling along a generally linear path with at least one of the percutaneous probe and the plunger as the plunger moves relative to the housing.
38. A method for deploying a percutaneous probe, comprising:
- engaging with a recipient's skin a housing having a percutaneous probe that is movable relative to the housing between a stowed position and at least one deployed position, the housing further having an attachment device configured to be releasably attached to the recipient's skin, the housing further having an external housing surface extending away from the attachment device and facing outwardly transverse to the attachment device;
- releasably attaching the attachment device to the recipient's skin;
- releasably coupling an actuator tool with the percutaneous probe;
- releasably gripping a gripping portion of the actuator tool; and
- deploying the percutaneous probe into the recipient's skin by moving the actuator tool at least until the gripping portion is adjacent to and laterally offset from the external housing surface.
39. The method of claim 38, further comprising:
- choosing a selected deployment depth from at least a first deployment depth and a second deployment depth;

deploying the percutaneous probe to the selected deployment depth in a recipient's tissue;

halting deployment of the percutaneous probe at the selected deployment depth with a depth control device of the percutaneous probe apparatus having one of at least two configurations;

withdrawing the percutaneous probe from the recipient's tissue; and
stowing the percutaneous probe in the housing.